Report presented at the 3rd National Conference on Semiconductor Compounds, Kishinev, 14-21 Sept 1963

-2-

2. Electrical properties of highly degenerate crystals of n- and p-type gallium arsenide. O. V. Yemel'yanenko, F. P. Kesamanly, D. N. Nasledov, V. G. Sidorov, G. N. Talalakin.

Concerning the interaction of electrons with lattice vibrations in gallium arsenide. O. V. Yemel'yanenko, T. S. Lagunova, D. N. Nasledov, V. Ye. Shcherbatov.

Electrical properties of gallium arsenide with different impurities. D. N. Nasledov, G. N. Talalakin.

Investigation of the properties of impurity zones in crystals of p-type gallium arsenide. O. V. Yemel'yanenko, T. S. Lagunova, D. N. Nasledov, V. Ye. Shcherbatov.

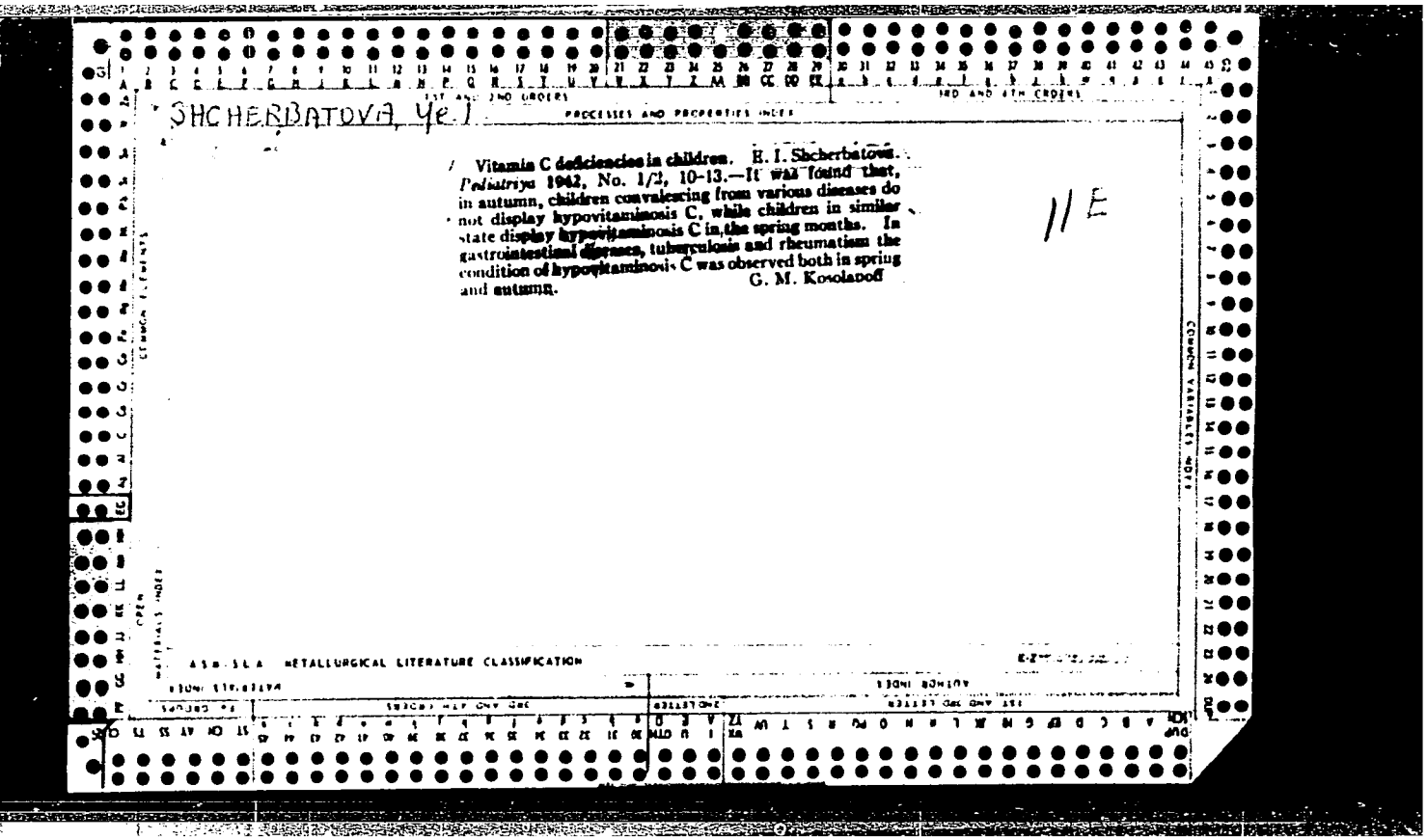
Galvanomagnetic properties of indium arsenide in a wide temperature range. Yu. M. Burdukov, I. V. Zatova, T. S. Lagunova, D. N. Nasledov.

Nernst effect in n-type indium phosphide.
F. P. Kesamanly, E. E. Klotin'.
(Presented by O. V. Yemel'yanenko--25 minutes).

BURDUKOV, Yu.M.; YEMEL'YANENKO, O.V.; ZOTOVA, N.V.; KESAMANLY, F.P.; KLOTYN'SH, E.E.; LAGUNOVA, T.S.; NASLEDOV, D.N.; SIDOROV, V.G.; TALALAKIN, G.N.; SHCHERBATOV, V.Ye. [deceased]

Transfer effects in $A^{III}B^{V}$ type compounds. Izv. AN SSSR. Ser. fiz. 28 no.6:951-953 Je '64. (MIRA 17:7)

1. Fiziko-tekhnicheskiy institut imeni A.F. Ioffe AN SSSR.



SHCHERBATOVA, Ye. I.

Vitamin C deficiencies in children. E. I. Shcherbatova. *Pediatriya* 1942, No. 1/2, 10-13.—It was found that, in autumn, children convalescing from various diseases do not display hypovitaminosis C, while children in similar state display hypovitaminosis C in the spring months. In gastrointestinal diseases, tuberculosis and rheumatism the condition of hypovitaminosis C was observed both in spring and autumn.
G. M. Kosolapoff

11 E

Shcherbatova, E. I.

The elimination of 17 keto steroids via the urine in rheumatic children. E. I. Shcherbatova. *Voprosy Okhrany Materinstva i Detstva* 1, No. 6, 40–5(1956); *Referat. Zhur. Khim., Biol. Khim.* 1957, No. 5318.—The process of elimination of 17 keto steroids (I) *via* the urine was studied in normal children and in children with rheumatism; the studies were made in age-groups. The results showed that the rate of I elimination in normal children varied greatly with the age of the children and to a slight degree with the sex. The general level of elimination of I in rheumatic children was lower than in the normal children especially during the acute symptomatological stage. B. S. Levine

BUBNOVA, M.H., professor; SHCHERBATOVA, Ye.I., dotsent

Effect of the adrenocorticotrophic hormone (ACTH) on the course of rheumatic fever in children. Vop.okh.mat. i det. 1 no.5:54-59 S-O '56. (MLRA 9:11)

(ACTH) (RHEUMATIC HEART DISEASE)

SHCHERBATOVA, Ye.I.; DEMINA, G.V.

Pelger's nuclear anomaly. Vop. okh. mat. i det. 5 no. 2:85-89 Mr-Ap '60. (MIRA 13:10)

1. Iz kafedry gospital'noy pediatrii (zav. - prof. K.F. Popov, nauchnyy rukovoditel' - prof. M.M. Bubnova) II Moskovskogo gosudarstvennogo meditsinskogo instituta imeni N.I. Pirogova (direktor - dotsent M.G. Sirotkina).
(LEUCOCYTES)

SHCH[illegible]A[illegible]VA Z. F.

Jun 52

USSR/Chemistry - Sulfonation

"Stereoisomerism of Ome ga-Styrenesulfonic Acid," A.P. Terent'yev, R.A. Gracheva, Z.F. Shcherbatova, Moscow State U imeni M.V. Lomonosov

"Dok Ak Nauk SSSR" Vol LXXXIV, No 5, pp 975 - 977

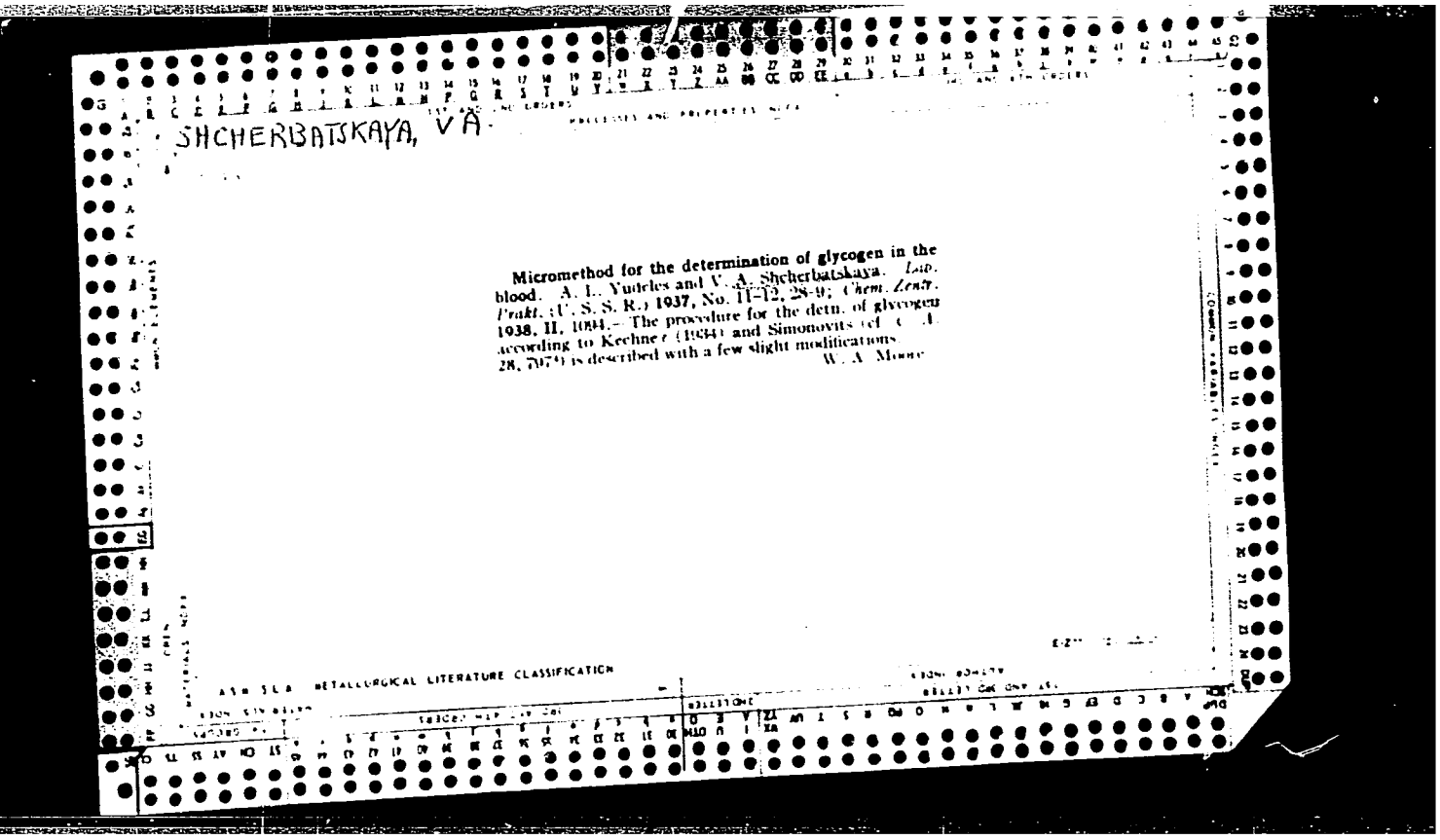
The authors prove d that the styrenesulfonic acid obtained by heating styrene with pyridinesulfurtrioxide is the trans isomer. Exposing the trans isomer to light from a quartz lamp for 100 hrs yielded the cis isomer. This was confirmed chemically and by the use of absorption and Raman spectra. Presented by Acad A.N. Nesmeyanov 11 Apr 52

223T15

BORODINA, N.A.; PLOTNIKOVA-VARTAZAROVA, L.S.; PETROVA, I.P.; CHEREMUSHKINA, E.I.; SHCHERBATSEVICH, V.D.

Special aspects of the wintering of plants in the arboretum of the Main Botanica Garden in 1960-1961. Biul. Glav. bot. sada no.51:12-23 '63. (MIRA 17:2)

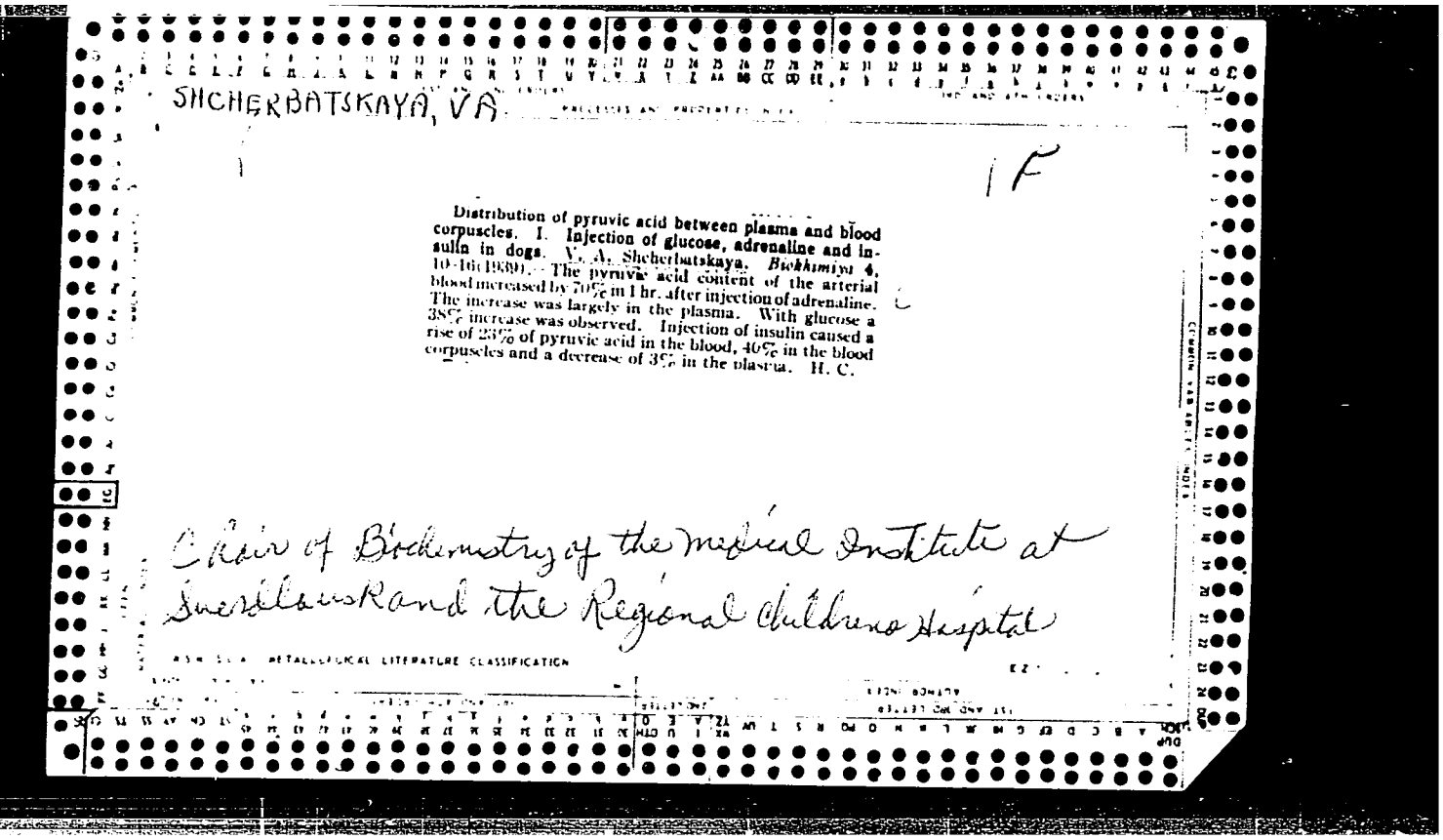
1. Glavnyy botanicheskiy sad AN SSSR.



SHCHERBATSKAYA, V A.

Micromethod for the determination of glycogen in the blood. A. L. Yudcles and V. A. Shcherbatskaya. *Lab. Prakt.* (U. S. S. R.) 1937, No. 11–12, 28–9; *Chem. Zentr.* 1938, II, 1084.—The procedure for the detn. of glycogen according to Keehner (1934) and Simonovits (cf. C. A. 28, 7074) is described with a few slight modifications.

W. A. Moore



SHCHERBATSKAYA, V.A.

1F

Distribution of pyruvic acid between plasma and blood corpuscles. I. Injection of glucose, adrenaline and insulin in dogs. V. A. Shcherbatskaya. *Biokhimiya* 4, 10-16(1939).—The pyruvic acid content of the arterial blood increased by 70% in 1 hr. after injection of adrenaline. The increase was largely in the plasma. With glucose a 38% increase was observed. Injection of insulin caused a rise of 25% of pyruvic acid in the blood, 40% in the blood corpuscles and a decrease of 3% in the plasma. H. C.

Chair of Biochemistry of the Medical Institute at Swerdlovsk and the Regional Children Hospital

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

USSR/Human and Animal Physiology (Normal and Pathological). T-3
Blood. Formed Elements.

Abs Jour : Ref Zhur - Biol., No 16, 1958, 74632

Author : Shcherbatskaya, V.A.
Inst : [redacted]
Title : Metabolism of Erythrocytes during Effects of Silicates and Amino Acids.

Orig Pub : Tr. Vses. konferentsii po med. radiol. Eksperim. med. radiol. M., Medgiz, 1957, 266-269.

Abstract : In tests in vitro a solution of sodium silicate (I), neutralized on a 75-80% solution of HCl, was mixed with concentrated or fresh blood and mixed with citrate blood of healthy or ill people or animals, and in 10 minutes a solution was added which contained p^{32}, from a calculation of 1000 pulse/min. per 1 ml of blood. After incubation and separation of the erythrocytes (E) their radioactivity was determined. p^{32} included in the E at values as low as

Card 1/4

Abs Jour : Ref Zhur - Biol., No 16, 1958, 74632

oros high as the concentration of I. I, beginning from a concentration of 1 mg per 1 ml of blood, caused hemolysis (H) which was strengthened at the addition of I per 0.1, 0.2, 0.3 mg/ml. For the removal of the effect of I the blood of 40 donors cystein (II) was first added. Depending on the concentration of I, the effect of II or I predominated. I, added in equimolar concentrations in relation to II, influenced the inclusion and increase of p^{32} in E. Methionine, alanine, thyrosine, leucine, tryptophan and in particular glycocol (III) protected E from H, caused I, but in distinction to II did not strengthen the accumulation of p^{32} in E and did not preserve the ability of E to accumulate p^{32} after the addition of I. II, seemingly, completely restores the reaction of phosphorylation in E, impaired furing the effectof the silicates. The fermentative character of reactions connected with the effect of

Abs Jour : Ref Zhur - Biol., No 16, 1958, 74632

II on the accumulation of p^{32} in E, appeared at 0°, 16 and 37°. 26 rabbits (R) received II for 6 days at 25 mg/kg; at the end, a solution of p^{32} from a calculation of 2500 pulse/min per 1 g was introduced subcutaneously. In 20 hours the content of p^{32} in the blood of these R was $1\frac{1}{2}$ times higher than in the control which had received only p^{32}. Consequently, the inclusion of p^{32} in E in the test R was less. The inclusion of P^{32} in E in vitro decreased from 22 to 12% after the introduction of R of I. The addition of II, and then P^{32} in the blood of R, which had received I, increased the accumulation of p^{32} in E even higher than before the effect on R of I. Analogous results were obtained on dogs (4) and rats (20). With the addition of III to the blood, the periods of its preservation lengthened to 8-10 days. For preservation of preserved blood and erythrocyte suspensions, solutions No 7 and

SHCHERBATSKAYA, V.A., dotsent, kand.med.nauk

Influence of silicon on phosphorus metabolism. Sbor. rab. po silik. no.2:197-201 '60. (MIRA 14:3)

1. Sverdlovskiy gosudarstvennyy meditsinskiy institut.
(SILICON—PHYSIOLOGICAL EFFECT)
(PHOSPHORUS METABOLISM)

SAKHAROV, M.I., doktor meditsinskikh nauk; SHCHERBATSKAYA, V.A., dotsent; LARIONOVA, Ye.M.; GORLOVA, M.A.

Influence of glycocol on the survival of erythrocytes in preserved blood and in an erythrocytic suspension as (revealed by experimental and clinical material). Probl. gemat. i perel. krovi 5 no.3:43-52 Mr '60. (MIRA 14:5)

1. Iz kafedry biologicheskoy khimii i meditsinskoy radiologii Sverdlovskogo gosudarstvennogo meditsinskogo instituta i Sverdlovskoy stantsii perelivaniya krovi.
(GLYCINE) (ERYTHROCYTES)
(BLOOD--COLLECTION AND PRESERVATION)

SHCHERBATSKIY, N.I.

Device for determining breaks in elastic multiple electric cables. Suggested by N.I.Sheherbatskii. Rats i izobr. predl. v stroi. no.15: 61-62 '60. (MIRA 13:9)

1. Po materialam tresta Elektroprommontazh-1 Ukrglavelektromontazha Ministerstva stroitel'stva USSR, Dnepropetrovsk.
(Electric cables--Maintenance and repair)

POPOV, A.G.; SHCHERBATYKH, I.M.

Method of checking the phase of the power supply in adjacent rail networks. Avtom., telem.i sviaz' 4 no.3:22-24 Mr '60. (MIRA 13:7)

1. Starshiye inzhenery laboratorii signalizatsii i svyazi Yugo-Vostochnoy dorogi.
(Railroads--Electric equipment)
(Electric measurements)

ANTONOV, V.I.; LYUBEVICH, O.V.; MIRZOYANTS, L.E.; SHCHERBATYKH, M.A.

The SDA-250 desiccating and grinding unit for the production of powdered milk. Biul.tekh.-ekon.inform.Gos.nauch.-issl.inst.-nauch.i tekh.inform. no.3:48-49 '62. (MIRA 15:5)
(Milk, Dried)

VASIL'YEV, Nikolay Aleksandrovich; GENKIN, Pavel Borisovich; SHCHERBATYKH, Maksim Alekseyevich; FEFERMAN, A.Ye., red.

[Sheepshearing and the classification of wool] Strizhka ovets i klassirovka shersti. Moskva, Rossel'khozizdat, 1965. 241 p. (MIRA 18:8)

BOL'SHAKOV, A., kand.tekhn.nauk; SHCHERBATYKH, N.

Control and regulation of the concentration of salt solutions.
Mias.ind.SSSR 32 no.6:17-18 '61. (MIRA 15:2)

1. Moskovskiy tekhnologicheskiy institut myasnoy i molochnoy promyshlennosti.
(Meat industry--Equipment and supplies) (Solution (Chemistry))

SHUMBATICH, Col. P. Ya. Col. Vet. Service, and LEBASHOV, A. A. Maf., Vet. Serv.

Mbr., Mil. Veterinary Acad., -c1948-. "Research in the Immunizing Properties of Radiation-Treated Vaccine against Contagious Encephalomyelitis in Horses," Veterinariya, No. 9, 1947. (8052103).

USSR/Microbiology - General Microbiology. F-1

Abs Jour : Ref Zhur - Biologiya, No 7, 1957, 26231

Author : Shcherbatykh, P.Ya.
Inst :
Title : Fermentative Activity of Dermatophytes Collected from Animals.

Orig Pub : V sb.: Eksperim. i klinich. issledovaniya. II, L., Medgiz, 1956, 52-53

Abst : The decomposition of carbohydrates cannot be used as a criterion in identifying species of dermatophytes that are pathogenic for domestic animals. Cultures of Trichophyton equinum, T. gypseum, T. faviforme, Microsporon lanosum and M. equinum cause the same carbohydrates to ferment and differ only in the intensity of the fermentation process. The most active are cultures of T. gypseum, while the least active are those of M. equinum.

Card 1/1

SHCHERBATYKH, P.Ya., doktor veterinarnykh nauk, professor; SIDORENKO, B.V., veterinarnyy vrach.

Vitality and resistance of the dry virus of epidemic encephalitis of horses to some physical factors. Veterinariia 33 no.11:39-42 N '56. (MLRA 9:11)

(Encephalitis viruses)

SHCHERBATYKH, P.Ya., prof.; TSION, R.A., prof.; PROTASOV, A.I., dots.; URBAN, V.P., kand.vet.nauk.; UZYUMOV, V.L., kand.vet.nauk; SIDORENKO, B.V.

Production and use of gamma globulin in treating swine for plague. Veterinariia 34 no.12:64 D '57. (MIRA 11:1)
(Swine plague) (Gamma globulin)

PROTASOV, A.I., dotsent; SINEV, A.V., prof.; SMIRNOV, A.M., dotsent; BAZHENOV, A.N., dotsent; VIL'NER, A.M., prof.; BASHMURIN, A.F., dotsent; SHAKALOV, K.I., prof.; VELLER, A.A., prof.; NIKANOROV, V.A., prof.; FEDOTOV, V.P., dotsent; KUZNETSOV, G.S., prof.; BOCHAROV, I.A., prof.; SHCHERBATYKH, P.Ya., prof.; TSION, R.A., prof.; GRIBANOVSKAYA, Ye.Ya., dotsent; ADAMANIS, V.F., assistent; KOLABSKIY, N.A., dotsent; MITSKEVICH, V.Yu., dotsent; GUSEVA, N.V., dotsent; MYSHKIN, P.P., dotsent; GUBAREVICH, Ya.G., prof.; FEDOTOV, B.N., prof.; DOBIN, M.A., dotsent; SIROTKIN, V.A., prof. [deceased]; KUZ'MIN, V.V., prof.; YEVDOKIMOV, P.D., prof.; POLYAKOV, A.A., prof.; POLYAKOV, P.Ya., red.; BARANOVA, L.G., tekhn.red.

[Concise handbook for the veterinarian] Kratkii spravochnik veterinarnogo vracha. Leningrad, Gos.izd-vo sel'khoz.lit-ry, 1960. 624 p. (MIRA 13:12)

(Veterinary medicine)

SHCHERBATYKH, P.Ya.,prof.; TSION, R.A.,prof.; PROTASOV, A.I.,dots.; URBAN, V.P., dots.; SIDORENKO, B.V.,kand.vet.nauk

Treating swine plague with specific gamma globulin. Veterinariia 36 no.1:36-40 Ja '59. (MIRA 12:1)
(Swine plague) (Gamma globulin)

LIKHACHEV, N.V.; SYURIN, V.N.; TSION, R.A.; SHCHERBATYKH, P.Ya.; ZOTOV, A.P.; SKOMOROKHOV, A.L.; PIROG, P.P.; PINUS, A.A.; BAZYLEV, P.M.; NAZAROV, V.P.; ORLOV, F.M., dots.; USACHEVA, I.G., red.; YARNYKH, A.M., red.; BALLOD, A.I., tekhn. red.; PROKOF'YEVA, L.N., tekhn. red.

[Virus diseases of animals] Virusnye bolezni zhivotnykh. Moskva, Sel'khozizdat, 1963. 564 p. (MIRA 17:1)

SHCHERBATYKH, P.Ya., prof.; MALUSHKO, V.V., kand. veterin. nauk; KALMYKOV, G.M., veterin. vrach; KOMISSAROV, K.P., veterin. vrach

Culture of the virus of infectious encephalomyelitis of horses in tissue cultures. Veterinariia 41 no.2:21-24 F '64. (MIRA 17:12)

1. Leningradskiy veterinarnyy institut.

SHCHERBATYKH, F.Ya., prof.; TSIGN, N.A., prof.; PROTASOV, A.I., dotsent; GRIBANOVSKAYA, Ye.A., dotsent; KORCBKO, I.R., veterinarnyy vrach

Use of specific globulins against paratyphoid fever in young pigs. Veterinariia 41 no.5:50-52 My '64. (MIRA 18:3)

1. Leningradskiy veterinarnyy institut.

SHCHERBATYKH, S.

In the valley of the St. Lawrence River. Vokrug sveta no.5:13-16 My '54. (MLRA 7:6)

(St. Lawrence Valley)

USSR / Cultivated Plants. Fodders. M-4

Abs Jour: Ref Zhur-Biol., No 6, 1958, 25106

Author : Shcherbatykh, S. P.
Inst : Voronezh Agricultural Institute
Title : A Short Survey of Selection Work with Sudan Grass

Orig Pub: Zap. Voronezhsk. s.-kh. in-ta, 1956, 26, No 2, 103-106

Abstract: A rapid-ripening Sudan grass variety, the Voronezhskaya 1 was developed at the Voronezh Agricultural Institute. Variety testing indicates that this variety either is not at all inferior or is very little less in fodder mass yielding capacity to the Odesskaya-25 variety which is districted to Voronezhskaya Oblast'; in its fodder quality and its output of seeds it considerably surpasses the Odesskaya-25. It has been allotted to Voronezh-

Card 1/2

SHCHERBATYKH, T.I.

New species of Carboniferous polyzoans from the region of the Kursk Magnetic Anomaly. Paleont.zhur. no.2:52-57 '60. (MIRA 13:7)

1. Voronezhskiy sel'skokhozyaystvennyy institut.
(Belgorod Province--Polyzoa, Fossil)

SHCHERBATYKH, T.I.

New early Carboniferous species Fenestella from the Kursk Magnetic Anomaly region. Paleont.zhur. no.1:58-62 '63. (MIRA 16:4)

1. Voronezhskiy sel'skokhozyaystvennyy institut.
(Kursk Magnetic Anomaly—Polyzoa, Fossil)

SHCHERBATYKH, V.A.

Automatic two-position machine for drilling flat parts.
Mashinostroitel' no.12:7 D '64. (MIRA 18:2)

[illegible], [illegible]

Automatic machine for [illegible] holes in [illegible] parts. [illegible] tekh.-ekon. inform. Gos. nauch.-issl. inst. nauch. i tekh. inform. 18 no.7:36-37 [illegible] '65. (MIRA 18:9)

Semiautomatic unit for chemical marking and conservation of combs. Biul. tekh.-ekon. inform. Gos. nauch.-issl. inst. nauch. i tekh. inform. 17 no.3:45-47 '64. (MIRA 17:9)

SHCHERBATYKH, V.A., inzh.

Universal swivel-type welding head. Svar.proizv. no.5:36 My '63.
(MIRA 18:6)

SHCHERBATYKH, V.A.

Automatic press for making tablets of plastics powder. Biul. tekh.-ekon. inform. Gos. nauch.-issl. inst. nauch. i tekh. inform. 18 no.2:28-29 F '65. (MIRA 18:5)

KRICHEVSKAYA, A.A.; GERSHENOVICH, Z.S.; SHCHERBATYKH, V.P.

Ammonia formation from amides in brain and liver homogenates exposed to increased oxygen pressures. Biokhimiia 24 no.3: 459-464 My-Je '59. (MIRA 12:9)

1. Chair of Biochemistry of the State University and the Biochemical Department of the Research Biological Institute, Rostov on Don.

(LIVER, metab.
ammonia synthesis from amides in homogenates exposed to high oxygen pressure (Rus))
(BRAIN, metab.
same)
(AMMONIA, metab.
brain & liver homogenates exposed to high oxygen pressure (Rus))
(ATMOSPHERIC PRESSURE, eff.
on brain & liver homogenate ammonia synthesis (Rus))

SHCHERBATYUK, I.

Operation of barges without crews. Rech. transp. 22 no.10: 10-11 O '63. (MIRA 16:12)

1. Glavnyy dispetcher Verkhne-Dneprovskogo parokhodstva.

ZHDANOV, V.M., prof.; ALEKSANDROV, B.; VARIN, I.Ye., vrach; SHCHERBATYUK, S.N., vrach (Kiyev); ARKAD'YEVA, R.I., vrach; KOL'GUNENKO, I.I., vrach-kosmetolog

Health hints. Zdorov'e 8 no.10:30-31 O '62. (MIRA 15:10)
(HYGIENE)

CHUBUKOV, A.A.; SHCHERBATYKH, V.A.

The Epp-1 uniflow press for the coating of electrodes. Mashinostroitel' no.6:41-42 Je '62. (MIRA 16:5)

(Hydraulic presses)

S/185/62/007/003/007/015
D299/D301

AUTHORS: Sandulova, H.V., Dronyuk, M.I. and Shcherbay, K.S

TITLE: Diffusion of indium in copper protoxide

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 7, no. 3, 1962, 269 - 292

TEXT:
The results are given of an experimental determination of the diffusion parameters of indium in copper protoxide; both single crystals and polycrystalline specimens were investigated. The radioactive isotope In^{114} was the diffusant. The diffusion coefficients were determined by the method of successive removal of thin layers, followed by measurements of gamma-radiation activity. The temperature dependence of the diffusion coefficient was investigated at temperatures of 600 to 1050° C. In order to reduce experimental errors, the diffusion coefficient was measured on several specimens, and its values --averaged. For single crystals, the temperature dependence of the coefficient is expressed by the formula

Card 1/5

Diffusion of indium ...

$$D = 0.16 \times 10^{3} \exp(-33500/RT). \quad (1)$$

The polycrystalline graph consists of 2 straight lines which are at a certain angle; this is an indication of 2 different diffusion mechanisms in polycrystalline specimens; the temperature dependence is expressed by the formula

$$D = 0.24 \times 10^{-7} \exp\left(-\frac{12400}{RT}\right) + 0.89 \times 10^{-5} \exp\left(-\frac{24800}{RT}\right), \quad (2)$$

where the first term corresponds to low temperatures. The single-crystal graph is a straight line; hence a single diffusion mechanism exists for both low- and high temperatures. In the case of polycrystalline specimens, the main contribution to the diffusion flow at low temperatures is due to migration through intercrystal layers, whereas at high temperatures the main factor is bulk diffusion. At equal temperatures, the diffusion coefficients in polycrystalline specimens are much higher than in single crystals. For comparison, the diffusion parameters of various impurities (Ag, Ti, Au, Cu) in copper protoxide, are listed in a table.

Card 2/3

Their diffusion parameters are close in value for both single- and polycrystals. This leads to the conclusion that the diffusion of these elements takes place through the vacancies. There are 1 figure, 1 table and 5 references: 0 Soviet-bloc and 5 non-Soviet-bloc. The references to the English-language publications read as follows: Sibbert, W. Castellan and W.J. Moore, J. Chem.Phys., 17, 1, 41, 1949; W. Moore, B. Selikson, J.Chem. Phys., 19, 1539, 1951.

ASSOCIATION: L'vivs'kyy politekhnichnyy instytut (L'viv Polytechnical Institute)

SUBMITTED: May 22, 1961

Card 3/3

L 26095-65 EWT(m)/EPF(n)-2/T/EWP(t)/EWP(b) Pu-4 IJP(c) JD/JG

ACCESSION NR: AP4049075 S/0148/64/000/011/0185/0188

AUTHOR: Shcherbedinskaya, A.V.; Minkevich, A.N.

23
20
B

TITLE: Diffusional saturation of molybdenum with carbon

SOURCE: IVUZ. Chernaya metallurgiya, no. 11, 1964, 185-188

TOPIC TAGS: molybdenum saturation, carbon diffusion, diffusional saturation, molybdenum carbide, molybdenum diffusion

ABSTRACT: The article reports the results of a study of the diffusion of carbon in molybdenum carbide. The diffusional saturation of the latter was carried out with C^{14}-labeled $BaCO_3$. Subsequent radiometric layer analysis yielded the concentration curves of the distribution of carbon in molybdenum carbide. The diffusion coefficients of carbon were determined in the range 900-1600C. They formed a straight line in the coordinates log D - 1/T; from the slope of this curve, the activation energy was found to be 67000 ± 5400 cal/g-at. To elucidate the mechanism of carbide formation, the authors also studied the diffusion of radioactive molybdenum Mo^{99} in molybdenum carbide, and concluded that when the latter is formed in the carbon — molybdenum system, the predominant diffusion is that of carbon. Orig. art. has: 3 figures, 1 table, and 2 formulas.

Card 1/2

L 26095-65

ACCESSION NR: AP4049075

ASSOCIATION: Moskovskiy institut stali i splavov (Moscow Steel and Alloys Institute)

SUBMITTED: 21Jul64 ENCL: 00 SUB CODE: MM

NO REF SOV: 001 OTHER: 001

Card 2/2

L 13531-66 EWT(m)/EPF(n)-2/T/EWP(t)/EWP(b)/EWA(c) IJP(c) JD/JG

ACC NR: AP5028980 SOURCE CODE: UR/0149/65/000/004/0123/0125

AUTHOR: Shcherbedinskaya, A. V.; Minkevich, A. N.

ORG: Moscow Institute of Steel and Alloys, Metal Science of Steel and High Strength Alloys Dept (Moskovskiy institut stali i splavov, Kafedra metallovedeniya stali i vysokoprochnykh splavov)

TITLE: Diffusion of carbon in the carbides of niobium and titanium

SOURCE: IVUZ. Tsvetnaya metallurgiya, no. 4, 1965, 123-125

TOPIC TAGS: thermal diffusion, carbon, titanium, niobium, periodic system, activation energy

ABSTRACT: A comparison of the diffusion parameters of nonmetals in refractory metals as a function of their position in the periodic table is of interest. In this connection, the article presents the results of an investigation of the diffusion of C in elements located in different groups of the periodic table: Ti (IV), Nb (V) and Mo (VI). The findings on the diffusion of C in Mo are presented in another study (A. V. Shcheberdinskaya, A. N. Minkevich, Izv. VUZ, Chernaya metallurgiya, no. 11, 1964). The diffusion coating of Nb and Ti with C was performed at 900-1500°C in a mixture of acti-

Card 1/2 UDC: 669.293+669+295

L 13531-66

ACC NR: AP5028980

vated carbon and $BaCO_3$ containing the radioactive isotope C^{14}, with subsequent radiometric analysis of the obtained carbide coatings and plotting of the concentration curves for C throughout the diffusion zone. After this, the diffusion coefficients were calculated from the concentration curves. It is established that the activation energy for the diffusion of C in the carbide of Ti (element of group IV) is higher (E = 83,000 cal/g-atom) than in the carbides of Nb (E = 64,500 cal/g-atom) and Mo (groups V and VI, respectively), which is in qualitative agreement with Dempsey's (Philos. Mag., 8, no. 86, 1963) theory of the electron structure of transition metals which claims that the maximum melting point is inherent in the compounds for which the number of d-electrons per atom is ≈ 6 and that formation of solid compounds with elements of group IV results in the increase in the number of d-electrons per atom to its optimal value (≈ 6) and hence also in a corresponding sharp increase in melting point. For elements of group VI, which have the optimal number of electrons per atom, the formation of chemical compounds is associated with the increase in this number and decrease in their melting points. Orig. art. has:

SUB CODE: 07, 11, 20/ SUBM DATE: 10Apr64/ ORIG REF: 003/ OTH REF: 002

Card 2/2

Category : USSR/Solid State Physics - Diffusion. Sintering E-6

Abs Jour : Ref Zhur - Fizika, No 3, 1957, No 6681

Author : Noskov, B.M., Kuznetsov, Ye.V., Shcherbedinskiy, G.V.
Inst : Gor'kiy, USSR
Title : Influence of Intragranular Separation Boundaries on the Coefficient of Self-Diffusion of Iron in Iron-Nickel-Carbon Alloys

Orig Pub : Fiz. Metallov, i metallovedeniye, 1956, 2, No 3, 489-493

Abstract : The coefficient of self-diffusion of iron is 2-3 times greaterin alloy specimens that have been subjected to martensitic transformation and have been again restored to austenite, than in speciemns that have not been subjected to martensitic trasnformation. This is caused by the presence of traces of previous martensite boundaries, along which intercrystalline diffusion is more rapid. These traces are eliminated gradually as the temperature increases during the time of heating. The energy of activation of the process of eliminating the traces is nearly equal to the activation energy of the intercrystalline self-diffusion.

SHCHERBEDINSKIY, G.V.

SHCHERBEDINSKIY, G.V.

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1-4E2c

STUDY OF GRAIN BOUNDARY DIFFUSION IN METALS. Presented at the International Conference on Radioisotopes in Scientific Research, Sept. 9-20, 1957 at Paris. No. UNESCO/NS/RIC/27. V. T. Borisov, V. M. Golikov, B. Y. Lyubov, and G. V. Shtsherbedinsky. London, Pergamon Press, Ltd., 1957. 17p.

A method is presented which allows to determine D and D_1 from the data of just one experiment. Comparatively short diffusion annealing is sufficient for its application; besides, the method does not require any infraction of the specimen's entirety. Analysis of kinetic regularities of the diffusion element penetration into the polycrystal ? allows us to draw some conclusions concerning the theory of applying the autoradiographic method for measuring diffusion parameters. Equations are obtained describing the form of the diffusion front near grain boundaries; this allows to make quantitative evaluations of autoradiographic data. (auth)

SOV/137-59-1-1517

Translation from: Referativnyy zhurnal Metallurgiya 1959 Nr 1 p 202 (USSR)

AUTHORS: Borisov V T Golikov V M Shcherbedinskiy G V

TITLE: Investigation of Boundary and Volumetric Diffusion Processes by the Method of Absorption of Beta-radiation (Obizucheniye pogranichnoy i ob"yemnoy diffuzii metodom pogloshcheniya β-izlucheniya

PERIODICAL: Sb. tr In-t metalloved i fiz metallov Tsentr n-i in-ta chernoy metallurgii 1958 Vol 5 pp 383-396

ABSTRACT: A description of experimental apparatus employing radioactive isotopes in studying grain-boundary diffusion processes by the radiation-absorption method The specimen is maintained in an Ar atmosphere and is heated by means of an alternating current passing through it. An Al filter of a thickness of 10μ is placed between the specimen and the radiation counter. A method permitting the determination of the coefficient of absorption of β-radiation is presented The design of an apparatus capable of depositing a radioactive layer by means of spraying is described and a method for the determination of the thickness of the layer is given

Card 1/1

M G.

AUTHOR: Shvartsman, L. A., Doctor of Chemical Sciences. 30-1-13/39

TITLE: The Practice of the Application of Isotopes for Technical Purposes (Iz praktiki primeneniya izotopov v tekhnike).

PERIODICAL: Vestnik AN SSSR, 1958, Vol. 28, Nr 1, pp. 79-83 (USSR)

ABSTRACT: The majority of reports delivered at the Paris Conference in 1957 dealt with problems of metallurgy. The Polish authors T. Mal'kevich and R. Vuzatovskiy used the radioactive isotopes Fe^{59} for the explanation of the distribution of non-metallic inclusions in a steel block, which get into the liquid metal during casting from the refractory materials. For this purpose iron oxide which was enriched by Fe^{59} was introduced into the raw clay from which the bricks for the lining of the casting device were made. After casting the ingots and blooms were autoradiographed, and besides the radioactive intensity of radiation of the metal was measured. These experiments were also carried out with various refractories in order to determine their influence. The Soviet metal experts V. T. Borisov, V. M. Golikov, B. Ya. Lyubov, and G. V. Shcherbedinskiy in their report dealt with problems of diffusion in real metals, which have a polycrystalline structure. A. A. Zhukhovitskiy, M. Ye. Yanitskaya, and A. D. Sotskov reported on the results of the

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The Practice of the Application of Isotopes for Technical Purposes. 3C-1-13/39

application of radioactive isotopes for the solution of certain problems of the diffusion theory. They developed a method which makes it possible to measure the diffusion- and thermodynamic characteristics of metallic mixed crystals simultaneously. The author described the methods of research by means of radioactive isotopes of the equilibrium of the distribution of elements between liquid iron and slags. O. S. Bogdanov and his collaborators described the methods of the application of radioactive isotopes for the investigation of processes of flotation and ore enrichment. The flotoreagents were marked by radioactive isotopes of sulphur, carbon, phosphorus, copper, iron, zinc, and calcium. Great scientific and practical interest was aroused by the problem of the solubility of slightly volatile substances in steam under high pressure: a report on this subject was delivered by M. A. Styrikovich. A. I. Veynik spoke about the application of isotopes for the investigation of heat- and mass transfer for the development of rational methods of drying porous materials. The conference showed that in the USSR and in other countries increased attention is being paid to the determination of new methods of using radioactive isotopes, both in industry and in agriculture, and that

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The Practice of the Application of Isotopes for Technical Purposes. 30-1-13/39

this is done not to the least extent because modern atomic industry is able to supply enormous quantities of these substances every day.

AVAILABLE: Library of Congress

1. Isotopes-Applications

Card 3/3

SHCHERBEDINSKIY, G. V., Candidate Phys-Math Sci (diss) -- "A study of the effect of the structural state of iron-nickel alloys on the diffusion of iron". Moscow, 1959. 12 pp (Central Sci Res Inst of Ferrous Metallurgy), 110 copies (KL, No 26, 1959, 123)

NOSKOV, B.M.; PAVLOV, P.V.; SHCHERBEDINSKIY, G.V.

Diffusion of tin in α and β-phases of the system copper - tin. Izv. vys. ucheb. zav.; fiz. no.4:163-167 '59. (MIRA 13:3)

1.Fiziko-tekhnicheskiy institut Gor'kovskogo gosuniversiteta imeni N.I. Lobachevskogo.

(Copper-tin alloys)

5(4) SOV/32-25-9-14/53

AUTHORS: Borisov, V. T., Golikov, V. M., Shcherbedinskiy, G. V.

TITLE: On the Determination of the Diffusion-Coefficients in Polycrystals From Concentration Curves

PERIODICAL: Zavodskaya laboratoriya, 1959, Vol 25, Nr 9, pp 1070-1072 (USSR)

ABSTRACT: Only qualitative evaluations of the experimental results obtained can be made since there is no theory as to the influence of the grain boundary on the form of the concentration curves which are obtained with the different variants of the layer analysis method. The present paper describes a method for the determination of the coefficients of the spatial diffusion D and boundary diffusion D_1 from the curves of the γ-radioactivity of the residue. The method may be used in such cases, where γ-radioactive isotopes are used in testing, and the concentration on the surface of the sample is constant during diffusion tempering. By using the scheme of a polycrystal described in a previous paper (Ref 1), equation (1) for the determination of the concentrate of the diffusing element is given. The solution of (1) results according to a suggestion by

Card 1/2

On the Determination of the Diffusion-Coefficients in Polycrystals From Concentration Curves

SOV/32-25-9-14/53

Whipple (Ref 2) and the integral radioactivity of the residue is determined according to equation (4). Diagrams are given which were obtained according to the method of the layer removal in the investigation of the autodiffusion of Fe in the alloy Fe-Ni-C by using the isotope Fe^{59} at 900°, and a tempering duration of 37.7 hours. There are 1 figure and 2 references, 1 of which is Soviet.

ASSOCIATION: Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (Central Scientific Research Institute of Ferrous Metallurgy)

Card 2/2

5(4)

AUTHORS: Borisov, V. T., Golikov, V. M., Shcherbedinskiy, G. V.

SOV/20-125-4-26/74

TITLE: The Influence of the Consequences of a Phase Transformation Upon Diffusion (Vliyaniye posledstviy fazovogo prevrashcheniya na diffuziyu)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 125, Nr 4, pp 786-789 (USSR)

ABSTRACT: Several papers (Refs 1,2) dealt with the influence exercised by the separating surfaces upon the diffusion rate. According to the results obtained by these investigations diffusion is accelerated if the grains of the polycrystal were crushed by a preceding phase transformation. The present paper intends to carry out a detailed investigation of this phenomenon. The test object used was an iron-nickel alloy: Ni 27.9 %; Si 0.02 %; vestiges of manganese; S 0.01 %; P-vestiges; Al 0.02 %; Cu-vestiges; Fe - the remainder. This alloy was chosen because at room temperature it may be either in the state with austenite structure or in that of martensite structure. In the alloy chosen in this case it is possible to investigate diffusion in austenite with a varying number of intergranular separating

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surfaces. The investigations were carried out by means of the absorption method (Ref 3) with the radioactive iron isotope Fe^{59} serving as diffusing element. For the purpose of determining the diffusion coefficients in the interior and on the boundaries of the grains the kinetic curve is necessary - the dependence of the integral radioactivity of the sample on the duration of diffusion-annealing. The samples of the alloy to be investigated were annealed for 3 hours at 1,200° in order to homogenize them. Immediately after annealing one of the series of samples was immerged in liquid nitrogen for the purpose of producing a martensite structure in them. The other sample retained its austenite structure. After this preliminary treatment a layer of Fe^{59} was sprayed on to the samples of both series in a vacuum, and the samples were then subjected to diffusion annealing in a temperature interval of from 700-1,200°. A diagram shows the original kinetic curves, which had been plotted with their original martensite- and austenite-structure. The radioactivity of the sample subjected to martensite transformation decreases considerably more slowly than

that of a sample which had an austenite structure in the initial state. All curves plotted within the temperature interval of from 1,200-800° are of this character. However, at 700° the activity of a sample that had a martensite structure before annealing decreases more rapidly than that of an austenite sample. According to the results obtained by these investigations there is, within a wide interval a difference in the diffusion rate of iron in the samples of an iron-nickel alloy with different pre-treatment. At high temperatures the diffusion coefficients for the samples of both series are practically in agreement. Various possibilities of explaining these phenomena are briefly discussed. According to the authors' opinion, it is most probable that diffusion is slowed down at the separating boundaries which are arranged perpendicular to the front of the diffusion. The authors thank Academician G. V. Kurdyumov for suggesting that this investigation be carried out. There are 3 figures and 5 Soviet references.

ASSOCIATION: Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (Central Scientific Research Institute of Ferrous Metallurgy)

S/126/61/011/005/008/015
E073/E535

AUTHORS: Borisov, V.T., Golikov, V.M. and Shcherbedinskiy, G.V.

TITLE: The Effect of a Separation Boundary on Diffusion in Metals

PERIODICAL: Fizika metallov i metallovedeniye, 1961, vol.11, No.5, pp.709-713

TEXT: It is well known that the diffusion properties (Ref.1: P. L. Gruzin, E.V. Kuznetsov, G.V. Kurdyumov, DAN SSSR, 1953, 93, No.6) and other properties (Ref.2: Golovchiner, Ya.M., Tyapkin, Yu.D., DAN SSSR, 1953, 93, No.1; Ref.3: Sadovskiy, V.D., Malyshev, K.A., Sazonov, B.G. "Thermally induced transformations in steel") of austenite after a $\gamma \rightarrow \alpha \rightarrow \gamma$ transformation differ from the properties of austenite which has not undergone this transformation. These differences may remain up to temperatures considerably in excess of the temperature of the reverse $\alpha \rightarrow \gamma$ transformation. As a result of these transformations, new separation boundaries appear within the austenite grains and are, in fact, the boundaries of the original martensite crystals. The present authors have investigated the effect of separation boundaries within the austenite grains on

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the self-diffusion of iron in the Fe-Ni (28% Ni) and Fe-Ni-C (29% Ni, 0.5% C) alloys. The coefficients of self-diffusion were determined in specimens subjected to martensitic transformation (series M) and also in specimens which remained austenitic (series A). The measurements were by the kinetic-absorption method and by the layer analysis method, separating volume diffusion from boundary diffusion. The isotope Fe-59 was employed. The temperature dependence of the volume diffusion determined by the kinetic-absorption method is plotted in Fig.1 (a - Fe-Ni alloy; b- Fe-Ni-C alloy). In the temperature range 800 to 1100°C, the diffusion coefficients of series M specimens, containing division boundaries additional to those of the series A specimens, were lower, which indicates that the intragranular boundaries have a braking effect. The general pattern of the results are in agreement with those obtained by the authors in earlier work using the layer analysis method (Ref.5: Zavodskaya laboratoriya, 1959, No.9) but the values obtained by the kinetic-absorption method are somewhat higher. In earlier work (Ref.6: DAN SSSR, 1959, 125, No.4), the present authors discussed some of the possible causes of the braking

of the diffusion and it was suggested that the most probable reason for this decrease in D was the presence of separation boundaries oriented perpendicularly to the direction of diffusion. The present paper gives a theoretical analysis of this problem in the case of diffusion of atoms through vacancies. Consider a set of planes X_1, X_2 in a cubic lattice which are parallel to each other and lie at the distance of Δx (Fig.2). Each atom lying on one of the planes has K nearest lattice sites of which K-2k lie in the same plane and k on each of the neighbouring planes. If Δt is the time during which an atom experiences a displacement to one of the two neighbouring planes with a probability 1/2, then it can be shown (Ref.7: S. Chandrasekar "Stochastic problems in physics and astronomy", Russian translation, 1947) that the diffusion coefficient is given by $D = (\Delta x)^2/2\Delta t$. In the case of diffusion through vacancies, the diffusion coefficient can be defined as follows. It is assumed that the probability of displacement to a neighbouring plane is equal to $\beta\Delta t/\tau$, where $\beta = kb$ is the probability for the presence of a vacancy among the k nearest sites, b is the average concentration of vacancies

Card 3/9

within the lattice and $1/\tau$ is the average activation frequency. Next, using the condition $\beta \Delta t/\tau = 1/2$, it is found that $\Delta t = \tau/2\beta$ and hence $D = \beta(\Delta x)^2/\tau$. An atom A (Fig.2) which does not lie in the immediate neighbourhood of the separation boundary, undergoes during the time Δt one excursion to the left and one to the right with a probability of 1/2. However, on the plane X_1 the excursion to the left during a small time interval Δt_1 occurs with the probability $\alpha = \beta \Delta t_1/\tau$, while the excursion to the right occurs with the probability $\gamma = \beta_1 \Delta t_1/\tau$, where $\beta_1 = kb_1$ and b_1 is the concentration of vacancies on the plane which is the separation boundary. For simplicity it is assumed that the boundary contains only a single atomic plane having the same coordination numbers K and k as the remainder of the lattice. An atom reaching the plane X_1 remains at rest during a time $\Delta t_1 = \tau/(\beta + \beta_1)$, which is determined by the condition $\alpha + \gamma = 1$. The time Δt_1 is N times smaller than Δt and $N = \Delta t/\Delta t_1 = (1 + \beta_1/\beta)/2$. The authors then determine the path of the particle which has undergone the transition $X_2 \rightarrow X_1$ towards

the end of an interval Δt in order to determine its position at the end of the next interval Δt, bearing in mind the fact that the process occurs in N steps. If an atom reaches the boundary after a $X_1 \rightarrow X_o$ transition, then the lifetime of the vacancy left by it on the X_1^o plane is $\tau/(K - k)$, while the time necessary for the atom to reach the energy sufficient for it to execute the next jump (activation time) is τ_1, where $1/\tau_1$ is the activation frequency on the separation boundary. Since usually $\tau_1 \ll \tau$, i.e. the vacancy does not succeed in disappearing during τ_1, it follows that the probability that the atom will be reflected from the separation boundary will be $\alpha_1 = \Delta t_o/\tau_1 = 1/(1 + \beta)$, while the probability that the atom will pass through the boundary is $\gamma_1 = \beta \Delta t_o/\tau_1 = \beta/(1 + \beta)$, where Δt_o is the lifetime of the atom on the boundary and is much less than Δt_1. The authors then determine the probabilities p and q that the particle reaching X_1 from X_2 will return to X_2 and that it will reach X_{-2} during the time interval Δt. It is shown that these two probabilities are given by:

$$p = \frac{\alpha}{2} \sum_{m=0}^{N-1} \left[\gamma^m + \left(\gamma \frac{1-\beta}{1+\beta} \right)^m \right], \qquad (1)$$

$$q = \frac{\pi}{2} \sum_{m=0}^{N-1} \left[\gamma^m - \left(\gamma \frac{1-\beta}{1+\beta} \right)^m \right]. \qquad (2)$$

The first expression holds when $\tau_1 \ll \tau$. Using the method described by Chandrasekar, it is then shown that the concentration of the diffusing atoms at a point on the separation boundary is given by

$$C(x, t) = (1 - z) C_0(x, t) + \int_{z \frac{\Delta t}{\Delta x}}^{t} C_0(x, \tau) g(t - \tau) d\tau \qquad (5)$$

where $C_0(x,t)$ is the concentration at this point in the absence of the separation boundary and $g(t)$ is a function whose Laplace-Carson representation is

$$g(p) = p \left\{ \left[1 + \frac{z}{1-z} \left(1 - \exp(-2p\Delta t) \right)^{1/2} \right]^{-1} - (1 - z) \right\}. \qquad (6)$$

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As can be seen from Eq.(5), the presence of the boundary leads to a reduction in the diffusion and the appearance of additional sources whose density is g(t). Thus, the effect of the separation boundary as determined by this simplified analysis is in qualitative agreement with experimental data. For a quantitative description it is necessary to take into consideration the effect of a large number of successively distributed boundaries of blocks and grains. It is likely that the larger the number of boundaries intersected by the diffusing atom, the larger will be their total braking effect. Therefore, during a decrease in temperature when the depth of the diffusion penetration decreases, the braking on transverse boundaries weakens and becomes suppressed as a result of acceleration of the diffusion on acount of longitudinally distributed boundaries. In the described experiments this occurred at about 700°C. A cessation of the braking effect in the range of high temperatures is attributed to a development of processes of relaxation in the structure, which led to a cessation of additional division boundaries in the specimens of the M-series. In the work of some authors an increase of the average diffusion

coefficient was observed with decreasing grain size. Apparently in such a case the depth of the diffusion zone is commensurate with the grain size and the accelerating effect of the longitudinal boundaries prevails over the decelerating effect of the transverse boundaries. There are 3 figures, 1 table and 9 references: all Soviet.

ASSOCIATION: Institut metallovedeniya i fiziki metallov TsNIIChM (Institute of Metal Science and Physics of Metals TsNIIChM)

SUBMITTED: June 23, 1960 (initially)
October 6, 1960 (after revision)

BORISOV, V.T., kand.fiziko-matematicheskikh nauk; GOLIKOV, V.M., kand.tekhn. nauk; SHCHERBEDINSKIY, G.V., kand.fiziko-matematicheskikh nauk

Effect of the interface on diffusion in polycrystals. Probl. metalloved.i fiz.met. no.7:501-521 '62. (MIRA 15:5)
(Metal crystals) (Diffusion)

S/020/63/149/006/012/027

L 16970-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD

AUTHOR: Borisov, V. T., Golikov, V. M., and Shcherbedinskiy, G. V.

56

TITLE: Statistical calculation of the self-diffusion coefficient in metals

PERIODICAL: Akademiya nauk SSSR. Doklady. v. 149, no. 6, 1963, 1307-1310

TEXT: The analysis of experimental results on the basis of the formula of diffusion coefficients provided by the theory of absolute reaction rates does not make it possible to directly associate the values of the preexponential factor and activation energy with some definite physical characteristics of a substance. This is achieved by more detailed analysis of activated state on the basis of a suitable model or a statistical calculation. Therefore, the authors describe a statistical examination of self-diffusion of atoms over the vacancies or positions of penetration in pure metals or weak solutions. A formula for the equilibrium concentration of vacancies is presented. It is found that the coefficient of diffusion over the vacancies does not explicitly depend on the characteristics of vacancies in equilibrium state but is determined by the potential energy and normal frequencies of activated state. There are 2 figures.

ASSOCIATION: Institut metallovedeniya i fiziki metallov Tsentral'nogo nauchno-issledovatel'skogo instituta chernoy metallurgii im. I. P. Bardina (Institute of Metallography and Metal Physics, Central Scientific Research Institute of Ferrous Metallurgy imeni I. P. Bardin)

SUBMITTED: December 4, 1962

Card 1/1

BORISOV, V.T.; GOLIKOV, V.M.; SAVILOV, Ye.S.; SHCHERBEDINSKIY, G.V.

Studying the diffusion of carbon in iron. Probl. metalloved. i fiz. met. no.8:305-310 '64. (MIRA 18:7)

L 16450-65 EWT(1) ESD(gs)/SSD/AFWL/ASD(m)-3

ACCESSION NR: AP4042046 S/0126/64/017/006/0881/0885

AUTHOR: Borisov, V. T.; Golikov, V. M./ Shcherbedinskiy, G. V. 13

TITLE: The relationship between diffusion coefficients and grain boundary energy

SOURCE: Fizika metallov i metallovedeniye, v. 17, no. 6, 1964, 881-885

TOPIC TAGS: atomic mobility, B F alloy, surface energy, nuclei formation, volumetric diffusion, lattice vacancy, B redistribution

ABSTRACT: Few data are available on the surface energy of grain boundaries. Therefore, the authors carried out a study of the relationship between volumetric and boundary diffusion and boundary energy. The considerably higher atomic mobility at grain boundaries as compared to the grain itself may be attributed to the excessive concentration of vacancies and low activation energy. The authors studied the selfdiffusion of Fe in an Fe-B alloy (other additives were C -- 0.001; Si -- 0.01; S -- 0.001 and P -- 0.01%). Boron did not appreciably affect volumetric diffusion of iron but inhibited boundary diffusion. Rising temperatures lowered the effect of B. Experimental values of volumetric and boundary diffusion provided the calculation of boundary energy at different temperatures. The authors

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L 16450-65
ACCESSION NR: AP4042046

consider the redistribution of boron between the grain and the boundary. They contend that the solubility of B in Fe being very low, the B atoms occupy the defective sites in the crystal lattice. Consequently, they argue, boron solubility depends on the concentration of defects. Boundaries are depleted of boron and the subsequent increase in the concentration of boundary vacancies may lead to nuclei formation of a new phase and lower the stability of austenite. Orig. art. has: 3 figures and 1 table.

ASSOCIATION: Institut metallovedeniya i fiziki metallov TsNIICHM (Institute of Metallography and Metal Physics, Central Scientific Research Institute of Ferrous Metallurgy)

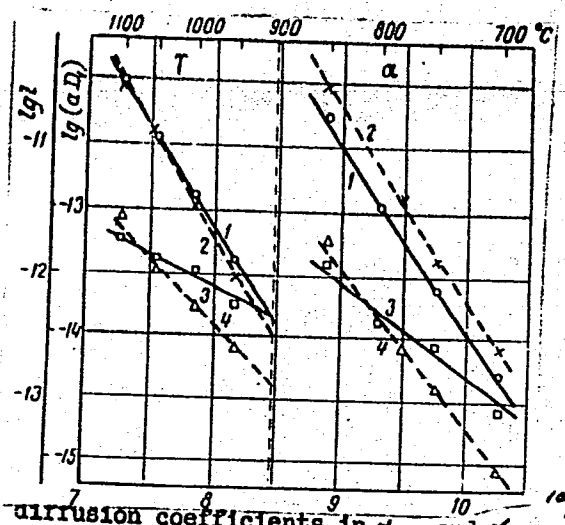
SUBMITTED: 12Dec62 ENCL: 01

SUB CODE: MM NO REF SOV: 004 OTHER: 004

Card 2/3

L 16450-65

ACCESSION NR: AP4042046



ENCLOSURE: 01

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Fig. 1. Temperature versus diffusion coefficients in α- and γ- phases: (1) volumetric selfdiffusion of Fe; (2) volumetric Fe diffusion in the Fe-B alloy; (3) boundary selfdiffusion of Fe; (4) boundary Fe diffusion in the Fe-B alloy

Card 3/3

L 23223-66 EWT(m)/T/EWP(t) IJP(c) JD/HW

ACC NR: AP6013599 SOURCE CODE: UR/0148/65/000/001/0095/0098

AUTHOR: Shovensin, A. V.; Minkevich, A. N.; Shcherbedinskiy, G. V.

ORG: Moscow Institute of Steel and Alloys (Moskovskiy institut stali i splavov)

TITLE: Diffusion of carbon into cobalt and nickel

SOURCE: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, no. 1, 1965, 95-98

TOPIC TAGS: cobalt, nickel, austenite, carbon, radioisotope, metal diffusion, radioactivity measurement

ABSTRACT: In connection with the influence of alloying elements on the diffusion of carbon into austenite, the authors studied the diffusion of carbon into alloying elements cobalt and nickel in the range of 700-1000°C. Radioactive carbon C^{14} was used, and the distribution of concentration per depth was measured. The conditions of homogenizing, to which the samples of cobalt and nickel were subjected, and the corresponding diffusion coefficients are tabulated. These data were used to plot the temperature dependence of the diffusion coefficients of carbon in cobalt and nickel. The values of the free energy Q and pre-exponential coefficient D_o obtained from these plots differ from those given in the literature, and the authors defend their results by pointing out the improvements involved in their approach to the problem. Orig. art. has: 4 figures, 3 formulas, and 1 table. [JPRS]

SUB CODE: 11, 18 / SUBM DATE: 16Dec63 / ORIG REF: 003 / OTH REF: 002

Card 1/1 UDC: 669.24:669.25

GOLIKOV, V.M.; BORISOV, V.T.; SHCHERBEDINSKIY, G.V.

All-Union scientific conference on diffusion in metals and alloys. Metalloved. i term. obr. met. no. 2:58-61 F '65.
(MIRA 18:12)

L 28512-66 EWT(i)/EWT(m)/T/EWP(t)/ETI IJP(c) JD/JG

ACC NR: AP6016595 (A) SOURCE CODE: UR/0129/66/000/005/0055/0057

AUTHORS: Benediktova, G. P.; Dubinin, G. N.; Karpman, M. G.; Shcherbedinskiy, G. V.

ORG: MAI, TsNIIChERMET

62
B

TITLE: Diffusion of potassium in mono- and polycrystalline molybdenum

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 5, 1966, 55-57

TOPIC TAGS: potassium, molybdenum, metal diffusion, physical diffusion, temperature dependence, polycrystal

ABSTRACT: The diffusion of potassium into mono- and polycrystalline molybdenum at a number of temperatures (800, 900, 1000, and 1100C) was studied. The experiments were carried out by exposing mono- and polycrystalline specimens of Mo to molten KCl or metallic K containing radioactive K^{42}. The diffusion coefficients were determined from the concentration distribution of K^{42} in the surface layers of the specimens. The experimental results are presented in graphs and tables (see Fig. 1). The diffusion coefficients for diffusion into mono- and polycrystalline molybdenum obeyed the relationships

$$D = 9{,}34 \cdot 10^{-9} e^{-\frac{26\,500}{RT}} \text{ [cm}^2\text{/sec]};$$

$$D = 2{,}86 \cdot 10^{-10} e^{-\frac{14\,600}{RT}} \text{ [cm}^2\text{/sec]},$$

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UDC: 539.12.172:669.24'28

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ACC NR: AP6016595

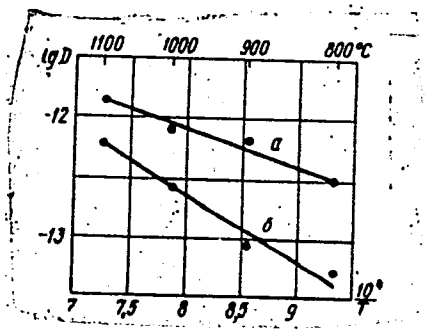

Fig. 1. Temperature dependence of the diffusion coefficients for the diffusion of potassium into molybdenum: a - polycrystal, b - monocrystal.

respectively. It is noted that the derived diffusion coefficients differ from those obtained by I. Cornides (Naturwissenschaften, 1958, v. 45, No. 6) by four orders of magnitude. Orig. art. has: 1 table and 2 figures.

SUB CODE: 11/ SUBM DATE: none/ ORIG REF: 002/ OTH REF: 006

Card 2/2

ACC NR: AP6027801 SOURCE CODE: UR/0126/66/022/001/0159/0160

AUTHOR: Borisov, V. T.; Golikov, V. M.; Shcherbedinskiy, G. V.

ORG: TsNIIChERMET im. I. P. Bardin

37

TITLE: Diffusion of molybdenum in iron and in an iron-molybdenum alloy

SOURCE: Fizika metallov i metallovedeniye, v. 22, no. 1, 1966, 159-160

TOPIC TAGS: metal diffusion, molybdenum, surface active agent, molybdenum containing alloy

ABSTRACT: It is of interest to investigate the diffusion of a surface-active component in an alloy already containing the same component. Theory indicates that for surface-active substances, under the conditions of a thermodynamic equilibrium, the coefficients of volume diffusion and diffusion along grain boundaries should not markedly differ from each other. If, on the other hand, the component diffuses through a pure solvent, it chiefly penetrates along the grain boundaries. Therefore, if the concentration of the active element is increased (to its equilibrium value), its mobility along the grain boundaries must decrease. Mo is a surface--active element with respect to Fe. In this connection, the authors investigated the diffusion

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of Mo (i.e. of the radioactive isotope Mo^{96}, electrolytically deposited on the surface of specimens) in polycrystalline specimens (with nearly uniform grain size: 5-10 μ) of pure Fe and Fe-Mo (0.7% Mo) alloy. The mean diffusion coefficient D_{av}, averaged for both volume diffusion and diffusion along grain boundaries, was determined by laminar analysis, while the coefficients for volume diffusion D_{vol} and diffusion along grain boundaries were separately determined by the absorption-kinetic method. Findings: for diffusion of Mo in pure Fe: $D_{av} = 0.3 \exp(-49,000/RT)$, and $D_{vol} = 7.8 \cdot 10^3 \exp(-73,000/RT)$. For diffusion of Mo in Fe-Mo alloy: $D_{av} = 2.24 \cdot 10^2 \exp(-64,000/RT)$ and $D_{vol} = 1.3 \cdot 10^4 \exp(-75,000/RT)$. The temperature dependence of D_{av} and D_{vol} (Fig. 1) indicates that the values of D_{av}, determined by laminar analysis, are higher, and the activation energy is lower, compared with the corresponding characteristics for purely volume diffusion. This is associated with the effect of grain boundaries, which is much smaller in the case of the Fe-Mo alloy. And indeed, the findings obtained by the absorption method indicate that, while activation energy and D_{vol} are similar in both pure Fe and in Fe-Mo alloy, the mobility of Mo atoms along grain boundaries is higher in pure Fe than in the Fe-Mo alloy. These findings confirm the above reasoning on the effect of surface-active elements.

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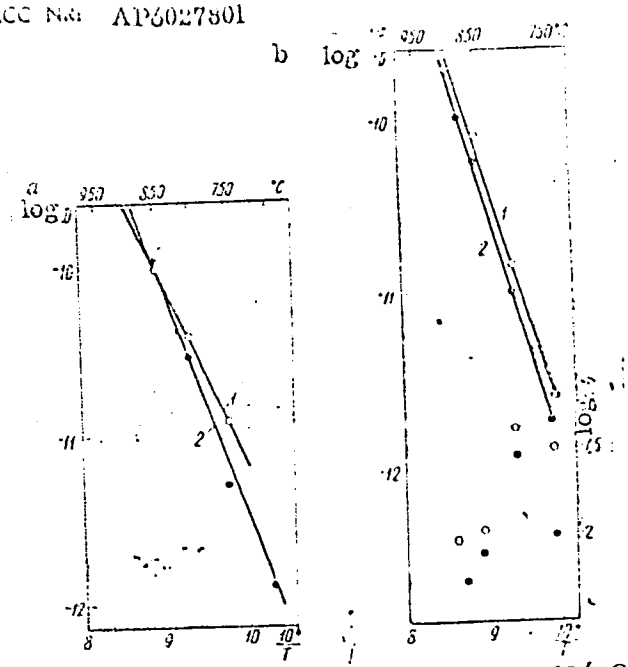


Fig. 1. Temperature dependence of D_{av} (a) and D_{vol} (b) for molybdenum:

1 - pure Fe; 2 - Fe-Mo; 2a - width of intergranular layer; $\theta = D_1/D$ (D_1 is the coefficient of diffusion along grain boundaries).

SUB CODE: 11,20/ SUBM DATE: 26Jun65/ ORIG REF: 004/ OTH REF: 001

ACC NR: AP6036899 (A) SOURCE CODE: UR/0226/66/000/011/0046/0051

AUTHOR: Shovensin, A. V.; Shcherbedinskiy, G. V.; Minkevich, A. N.

ORG: Central Scientific Research Institute of Ferrous Metallurgy (Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii)

TITLE: Characteristics of carbon diffusion in molybdenum carbide

SOURCE: Poroshkovaya metallurgiya, no. 11, 1966, 46-51

TOPIC TAGS: molybdenum carbide, carbon diffusion, thermal diffusion, diffusion, diffusion saturation

ABSTRACT: Temperature relationships are determined for the self-diffusion and heterodiffusion coefficients of carbon in mulybdenum carbide, expressed by the ratio $D = 0.3 \exp(-67,000\ RT)\ cm^2/sec$ and $D = 3 \cdot 17 \cdot 10^3 \exp(-78,000\ RT)\ cm^2/sec$, respectively. The heterodiffusion coefficients, at temperatures investigated, exceed the self-diffusion coefficients by approximately two orders of magnitude. The difference in diffusion coefficients can be explained by a strong dependence of the thermodynamic activity on the concentration of carbon in molybdenum carbide. Orig. art. has: 6 formulas and 4 figures. [Based on authors' abstract] [NT]

SUB CODE: 11/SUBM DATE: 20Dec65/ORIG REF: 003/

Card 1/1

SHCHERBENKOV, V.A.

Reinfusion of blood at a regional hospital. Zdrav. Bel. 7 no.9: 64-65 S '61. (MIRA 14:10)

1. Iz Goretskoy rayonnoy bol'nitsy (glavnyy vrach rayona V.F.Klimov).
(BLOOD--TRANSFUSION)

SHCHERBICH, V., inzh.

Industrial methods for installing electric wiring in large-panel apartment houses. Zhil.stroi. no.6:16-17 Je '60. (MIRA 13:7)

(Apartment houses) (Electric wiring, Interior)

SKURIKHIN, A.F.; SHCHERBIN, A.G.

Efficiency promoters of Domanovichskiy Vegetable Dehydrating Plant. Kons. i ov. prom. 13 no.9:16-17 S '58. (MIRA 11:10)

1. Domanovichskiy ovoshcheaushil'nyy zavod.
(Vegetables--Drying)

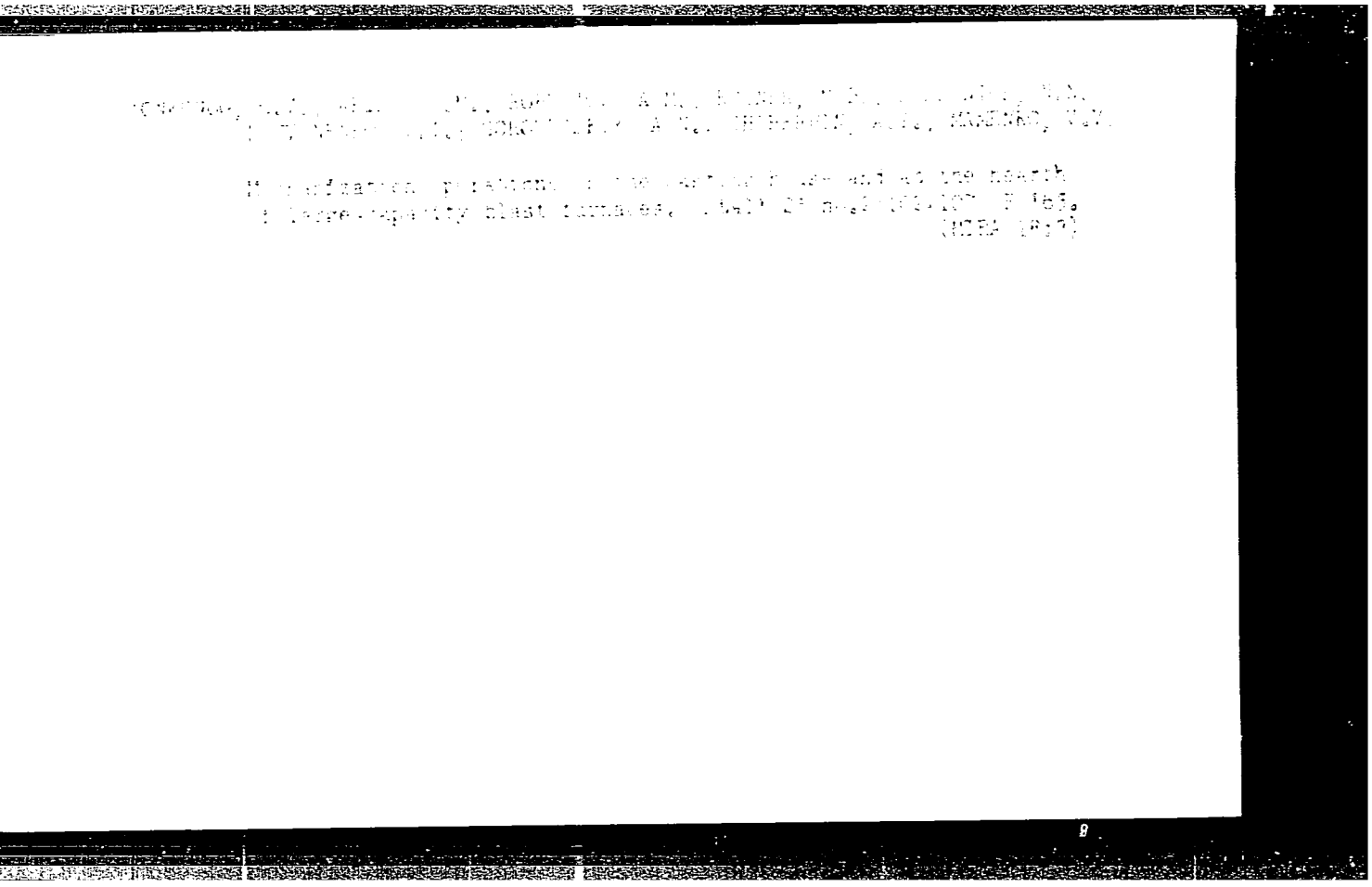
GOLDBLATNIY, A.L.; ROBUSTOV, A.L.; ALIST, L.L.; SHCHERBIN, ...I.

Automatic dust removal from open hearth furnace roof arches. Metallurg (MIRA 17:9)
9 no.6:16-19 Je '64.

1. [illegible].

[illegible], V.I.; [illegible], A.M.; [illegible], [illegible]; [illegible], A.I.

Machine for opening the cast iron tapping hole of a blast furnace. Met. i gornorud. prom. no.2:70-72 Mr-Ap '65. (MIRA 18:5)



DUSHEVSKIY, P.L., inzh.; IVASHKEVICH, V.P., inzh.; SHCHERBIN, K.P., inzh.

Using hard alloys in drop forging. Mashinostroenie no.6:18-19 N-D '63. (MIRA 16:12)

SHCHERBIN, M.Ya. [Shcherbin, M.IA.], kand.filos.nauk

A weapon in our struggle against revisionism. Nauka i zhyttia 9 no.4:23-25 Ap '59. (MIRA 12:7)
(Communism)

SHCHERBIN, S.K., master elektrokhozyaystva

Mechanical device for brake release of the drum of section warping machines. Tekst.prom. 22 no.10:78 O '62. (MIRA 15:11)

1. Krutil'no-tkatskaya fabrika Margelanskogo shelkovogo kombinata.

(Warping machines)

SHCHERBIN, S.K.

New design of the start button of mechanical looms. Tekst.prom. 23 no.11:68 N '63. (MIRA 17:1)

1. Master elektrokhozyaystva krutil'no-tkatskoy fabriki Margelanskogo shelkovogo kombinata.

SHCHERBIN, S.S.; OSETROV, O.A.

Primary dissemination haloes of rare elements in pegmatites as a criterion for hidden ore prospecting. Geol.rud.mestorozh. no.6:79-90 N-D '61. (MIRA 14:12)

1. Institut tsvetnykh metallov, Moskva.
(Ore deposits)

SHCHEREIN, S.S.

Ratio of tantalum and beryllium in some pegmatite bodies. Geol.-rud.mestorozh. no.2:90-101 Mr-Ap '62. (MIRA 15:4)

1. Institut tsvetnykh metallov, Moskva.
(Tantalum) (Beryllium)

KOTLYAR, V.N.; OSTROV, O.A.; SHCHERBIN, S.S.

One example of the genetic association of rare-metal pegmatites with granites. Izv.vys.ucheb.zav.; geol.i razv. 5 no.3:62-69 Mr '62. (MIRA 15:4)

1. Moskovskiy institut stali.
(Pegmatites) (Granite)

KULEV, N.A.; [illegible]

Thermal decontamination of the wastes of chemical industries with consecutive utilization of the waste heat. Khim. prom. 41 no.5:380-383 My '65. (MIRA 18:6)

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SOV/54-59-4-8/22

AUTHOR: Shcherbin, Yu. P.

TITLE: The Calculation of the Contribution of the Mesic Atom State in the "Nonphysical" Region of the Dispersion Relations for the Scattering of Mesons on Nucleons

PERIODICAL: Vestnik Leningradskogo universiteta. Seriya fiziki i khimii, 1959, Nr 4, pp 64-69 (USSR)

ABSTRACT: The investigation under review was carried out in continuation of references 1, 2, where the disregard of the contribution of the mesic atom state to this relation is regarded to be the possible cause of the deviation of the phase analysis of experimental data from the dispersion relation. This contribution is investigated here with respect to the scattering of π-mesons on protons. It is shown that the relative magnitude of this contribution does not exceed 40%, i.e. that the π-mesic atom state cannot be regarded to be the source of the above deviation. This paper is subdivided into three chapters. The first deals with the calculation of the π-mesic atom state to derive the interaction constants therefrom. They are determined from the best agreement found with the experiment. The second and third chapters deal with theoretical determination of the constant to be calculated in statistical approximation of the meson theory.

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SOV/54-59-4-8/22

The Calculation of the Contribution of the Mesic Atom State in the"Nonphysical" Region of the Dispersion Relationsfor the Scattering of Mesons on Nucleons

Data are compared with values obtained by other authors and those obtained in the first chapter. The contribution of the π-mesic atom state was found to decrease to 4% with energies in the vicinity of the resonance energy. Finally, the author thanks F. M. Kuni for supervision and assistance, and Yu. V. Novozhilov for discussions and valuable advice. There are 8 references.

SUBMITTED: August 20, 1958

Card 2/2